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Abstract
Ultra-wideband (UWB) communication technology has the characteristics of low-cost, low power consumption and high-speed data transmission. In recent years, UWB technology has developed into two major systems. One is Orthogonal Frequency Division Multiplexing (OFDM) system which is led by Intel, and the other is Direct Sequence Code Division Multiple Access (DS-CDMA) system which is supported by Motorola. This thesis presents the influence of frequency offset in the DS-CDMA system by simulation using MATLAB program. In the simulation, the Radio Frequency (RF) band is on the 3~5 GHZ and the type of receiver is a simple Direct Conversion Receiver (DCR) architecture.
In our study of the DS-CDMA system, the modulation is based on the standard provided by XtreamSpectrum. According to their documents, there are two technologies, Binary Phase Shift Keying (BPSK) and quaternary Bi-Orthogonal Keying (4-BOK), can be adopted. In the standard, a symbol is resulted form a source data multiplied by a special spreading code with Root Raised Cosine Filter (RRC Filter) transmission.
DCR is a trend of receiver architecture design. It offers an advantage that the image-reject filter is not required since the problem of image is circumvented by zero-IF. On the other hand, it suffers from some problems, such as DC offsets, which can be alleviated using high-pass filtering after I/Q demodulation. In this thesis, we study the influence of local frequency offset, which also results in DC offset, in the DS-CDMA system with DCR receiver architecture. By Matlab program, we present the communication performance evaluation based on Bit Error Rate (BER) simulation and determine the optimal value of HPF 3-dB frequency corresponding to the different frequency offsets. Finally, according to the simulation results, we complete some filter designs, circuit simulation and fabrication. These simulation results are very useful for the RF circuit/system designers in UWB DS-CDMA system.
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